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[Original Article]

# Online Flow: Effects of Perceived Challenges Measured Before and After a Shopping Task

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## Abstract

The purpose of this study is to examine the difference between perceived challenges measured before and after shopping online for fashion products and their effects in leading to flow. An online survey including an online shopping task was conducted with a national sample of 500 adult consumers recruited in the U.S.A. The paired t-test results show that perceived challenge measured before the task is significantly higher than perceived challenge measured after the task. ANOVA results further show that the interaction effect between skill and challenge on flow is significant only when perceived challenge is measured after that task. Implications of the findings and recommendations for further research are also discussed.

*Keywords: Challenge, Flow, Measurement, Online, Shopping*

## I. Introduction

Consumers' purchase decision making entails a problem-solving process. They search for various kinds of information to compare and evaluate products for the purpose of finding a right product that meets their needs (Blackwell, Miniard, & Engel, 2006). In particular, shopping online for fashion products can be a challenging task to consumers because of both environmental characteristics (i.e., online shopping) and product characteristics (i.e., fashion products). A greater accessibility to the vast amount of information on the Web is usually regarded as a benefit of online environments that can make consumers' information searching easier and subsequently accelerate consumers' purchase decision making process. However, the confusion caused by too much information may sometimes pose a challenge in shopping online (Gao, Zhang, Wang, & Ba, 2012). Another probable challenge of online shopping arises from the fact that consumers are unable to touch and feel products in online shopping environments. Because consumers need to consider how well a fashion product matches their other fashion items as well as their body shape, the inability to touch and feel can be more challenging to consumers shopping online for fashion products (Yu, Lee, & Damhorst, 2012). Therefore, the degree of challenge

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a consumer perceives should be considered as an important variable in studying purchase decision making in the context of online shopping for fashion products.

To some degree, the challenge is beneficial to consumers because it can lead them to a positive mental state called flow, subsequently facilitating purchase behaviors (Hoffman & Novak, 2009). Flow refers to "the state in which people are so involved in an activity that nothing else seems to matter" (Csikszentmihalyi, 1991, p. 4). If the degree of consumers' perceived challenge in a shopping activity deviates from the consumers' skill level, consumers are likely to feel boredom or anxiety rather than flow. Accordingly, prior studies have demonstrated that both consumers' skill and challenge perception can be the keys to achieving the state of flow in a shopping activity (Hoffman & Novak, 2009; Wang & Hsu, 2013).

Although the effects of the key variables on flow have been emphasized, the effects of measurement timing on them has not been fully discussed in prior studies. We argue that the measurement timing of perceived challenge is a critical factor when determining perceived challenge, which in turn influencing flow in online shopping because the retrospective recollection that has been widely used in survey research may cause respondents' distorted memory (Chen, 2006). Based on the changeable nature of people's affective states (Wang & Hsu, 2013), consumers' challenge perception in online shopping may also vary depending on measurement timing. Given that little is known about whether perceived challenge is fixed over time or sensitive to measurement timing, this study aims to examine the difference between the perceived challenges measured before and after shopping online for fashion products and their relative effectiveness in explaining flow.

## II. Background

According to flow theory, flow is regarded as the highest quality of human experience (Csikszentmihalyi & LeFevre, 1989). In order to clarify the process of how to make people reach the state of flow, many researchers have studied about the antecedents (Guo & Poole, 2009; Hsu, Chang, & Chen, 2012; Rose, Clark, Samouel, & Hair, 2012), dimensions (Bridges & Florsheim, 2008; Guo & Klein, 2009), or consequences (Rose et al., 2012; van Noort, Voorveld, & van Reijmersdal, 2012) of flow. Skill and challenge are found to be two major determinants of flow. Skill is considered as a person's ability to successfully conduct a task, while challenge is considered as the degree in which a person perceives full use of his or her abilities required to fulfill the task (Shim, Forsythe, & Kwon, 2015).

Csikszentmihalyi (1991) theorizes that flow occurs when skill matches the formidable challenge of a task. If a consumer's skill levels are not high enough to successfully conduct a shopping task, the consumer is unlikely to experience the flow state but likely to feel overwhelmed. On the contrary, a skillful consumer performing a very easy task is also unlikely to experience the flow state; the consumer may feel bored. Thus, flow can be influenced by an interaction effect between skill and challenge, rather than direct effects of skill and challenge, because the proper levels of both skill and challenge are necessary for a consumer to reach the state of flow.

However, prior studies applying the flow theory have unclearly stated when the challenge perception needs to be measured. While it is generally acknowledged that skill is a personal attribute that could be acquired by continuous training for a period of time, challenge perceptions can change even in a short period of time according to the change in the perceived amount of efforts necessary to complete an assigned task. As the challenge perception can change depending on a circumstance, consumers may perceive different degrees of challenge before and after conducting a

shopping task. Furthermore, a consumer's estimation of how much effort would be needed to perform a shopping task is likely to depend on the consumer's knowledge about the task. A consumer who already has the same or similar shopping experiences as a given shopping task could more easily imagine how challenged the shopping task would be because the amount of information can increase a person's confidence in a judgement (Tsai, Klayman, & Hastie, 2008). As the experience of performing a shopping task is informational, the timing of when perceived challenge is measured (i.e., before a shopping task vs. after the task) could matter in demonstrating the flow theory. In particular, perceived challenge measured before a shopping task is expected to be higher than that measured after the task because of a lack of information (i.e., the experience of performing the task), as expressed in the following hypothesis.

H1. Perceived challenge will be significantly higher before performing the online shopping task than after performing the task.

The different degrees of perceived challenge before and after the task may also affect the occurrence of flow. As flow is characterized by positive emotions as well as a strong sense of control while concentrating upon a task (Hoffman & Novak, 2009), a consumer's mental process of reaching the state of flow may occur during the task. Pearce, Ainley, and Howard (2005) regard flow as a process reflecting a change of state rather than an overall state, by underlining a changeable nature of skill and challenge perceptions as well as flow. Wang and Hsu (2013) also emphasize the necessity of measuring flow and related variables in different time span and suggest that the balance of skill and challenge would influence a person's attention during a task, based on electroencephalography brainwave signal data. These prior findings imply that perceived challenge had better be measured during or immediately after a shopping task rather than before the task, to predict flow more accurately. As perceived challenge measured before the task is purely based on the consumer's expectation of the task, not a real experience of the task, it may be hard to have an interaction with skill that results in occurrence of flow. Thus, perceived challenge measured after the task is expected to be more appropriate to verify the major proposition of the flow theory (i.e., the interaction between skill and challenge leading to flow) rather than perceived challenge measured before the task. Therefore, the following hypotheses are plausible:

H2. There is no significant effect of the interaction between perceived challenge measured before performing the online shopping task and skill on flow.
H3. There is significant effect of the interaction between perceived challenge measured after performing the online shopping task and skill on flow.

## III. Methods

This study inserted an online shopping task in the midst of an online survey so that perceived challenge could be measured twice (i.e., before and after performing the task). Moreover, participants responded immediately following the task while their memory of the task was fresh.

### 1. Sample

The online shopping task used in this study was performed on an existing shopping Website of a fashion brand targeting young female consumers. Thus, survey respondents were limited to young female adults. Data were collected by using a national sample of 500 U.S. female adults aged 20 to 34. The sample closely represented the U.S. population demographics, including Caucasians (69.6%), African Americans (12.0%), and others such as Hispanics and Asians.

### 2. Instruments and Procedure

Respondents first completed a 15-item scale measuring consumers' skill (Novak, Hoffman, & Yung, 2000; Reece & Kinnear, 1986). Then, they were informed of the shopping task instruction and completed a perceived challenge measure, which consisted of four items adapted from Novak et al. (2000), based on their prediction of the shopping task. Respondents then performed the shopping task in which they selected a shirt or top to purchase on an existing shopping Website which was randomly assigned to the respondents among selected top ten national fashion retailers' Websites announced by Women's Wear Daily (WWD, 2008). Additionally, in order to create challenge, the respondents were required to consider product quality, style, color, fit, coordination with existing wardrobe, and price in making the purchase decision (Claxton & Ritchie, 1979). After conducting the shopping task, respondents again completed the perceived challenge measure based on their experience of the shopping task. Then they completed the online flow measure (33 items) adapted from multiple existing sources (Guo & Poole, 2009; Jackson & Marsh, 1996; Klein, 2003; Novak et al., 2000) and demographic items. All skill, challenge, and flow measurements were responded on a 7-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree).

## IV. Results

### 1. Validity and Reliability Checks

In order to assess the validity and reliability of all scales used, the measurement items were pilot-tested with using a convenience sample of 150 U.S. female college students. Based on the results of principal component analyses with Varimax matrix of the pilot data, wordings of the measurement items with a low factor loading or cross-loadings were revised for the national sample study. When the national sample data were analyzed through principal component analyses with Varimax matrix, the items still having low factor loadings or cross-loadings in spite of the item revision were eventually eliminated in order to establish the convergent and discriminant validity of the measurements. Cronbach's alphas of items for all components were over .70, establishing the reliability of measurement scales.

Perceived challenge items are found to consist of one component for both before and after a shopping task. The mean scores of these items were calculated and used for further analyses. Although the principal components analysis revealed four components for each of the skill and flow constructs, a single composite score were generated for each construct by averaging the four component scores, which were calculated by averaging scores of all items from each component (Hair, Black, Babin, & Anderson, 2009). Because this study focused on which perceived challenge measurement timing is more applicable to flow theory, using each of the skill, challenge, and flow constructs as a single index score was deemed more suitable for the hypothesis testing, in spite of the multidimensionality of each

construct. Cronbach's alphas of all skill items (.886) and all flow items (.952) were over .70, also establishing the reliability of these scales.

### 2. Hypothesis Testing

In order to verify whether there would be a difference between the perceived challenges before and after performing the shopping task, a paired t-test was conducted on the perceived challenge composite score. The results revealed that the perceived challenge before the task (M = 4.18) was significantly higher than that after the task (M = 3.74), $t = 9.411$, $df = 499$, $p < .001$, supporting H1. The result implied that consumers' experience of performing the shopping task alleviated their perceived challenge.

A series of two-way analysis of variance (ANOVA) were conducted to test H2 and H3, which together predicted that perceived challenge measured after (vs. before) the task would be more appropriate to test the skill × challenge interaction effect for flow theorized in the flow theory. Skill and the two kinds of perceived challenge, used as independent variables, were converted into categorical variables, each with two levels (i.e., high vs. low) constructed based on a median split of the respective scale composite scores ($Md_{skill} = 5.61$; $Md_{pre\text{-}task\ challenge} = 4.00$, $Md_{post\text{-}task\ challenge} = 3.75$). Results of independent sample t-tests verified the difference between the high and low levels of skill ($M_{high} = 6.18$, $M_{low} = 4.78$, $t_{498} = -27.902$, $p < .001$), perceived challenge before the task ($M_{high} = 5.08$, $M_{low} = 3.27$, $t_{498} = -25.562$, $p < .001$), and perceived challenge after the task ($M_{high} = 4.87$, $M_{low} = 2.61$, $t_{498} = -28.950$, $p < .001$). An initial ANOVA assessed the interaction effect of skill and perceived challenge before the task on flow as well as the main effects of the two independent variables. The ANOVA results revealed that the main effects of skill and perceived challenge before the task on flow were significant, whereas the interaction effect of skill and challenge on flow was not significant, supporting H2 (see Table 1).

Table 1. ANOVA of skill and perceived challenge before vs. after the task at flow

| Source | *df* | *F* | *p* | Source | *df* | *F* | *p* |
|---|---|---|---|---|---|---|---|
| Skill | 1 | 78.589 | .000 | Skill | 1 | 83.210 | .000 |
| Pre-task challenge | 1 | 55.814 | .000 | Post-task challenge | 1 | 41.294 | .000 |
| Skill X Pre-task challenge | 1 | 2.079 | .150 | Skill X Post-task challenge | 1 | 12.871 | .000 |
| Error | 496 | | | Error | 496 | | |

As Table 1 shows, another ANOVA followed to assess the interaction effect of skill and perceived challenge after the task on flow as well as the main effects of the two independent variables. The results of second ANOVA revealed not only the significant main effects of skill and perceived challenge after the task, but also the significant interaction effect of skill and challenge on flow are all significant, supporting H3. As Figure 1 shows, the mean score of flow was the lowest in the condition of low skill and low challenge (M = 4.58, SD = 0.95) and slightly increased in the condition of high skill and low challenge (M = 5.02, SD = 0.96), implying that enhanced skills can lead to the state of flow when a task is not much challenging. However, the positive effect of skill on flow appears to be stronger when a task is highly challenging, based on a larger increase in the mean scores of flow from the condition of low skill and high challenge (M = 4.81, SD = 0.81) to the condition of high skill and high challenge (M = 5.81, SD = 0.80). In

other words, when perceived challenge after the task is high, the effect of skill on flow is more enhanced. Overall, The ANOVA findings imply that key propositions of the flow theory can be verified by using perceived challenge measured after the task, not perceived challenge measured before the task.

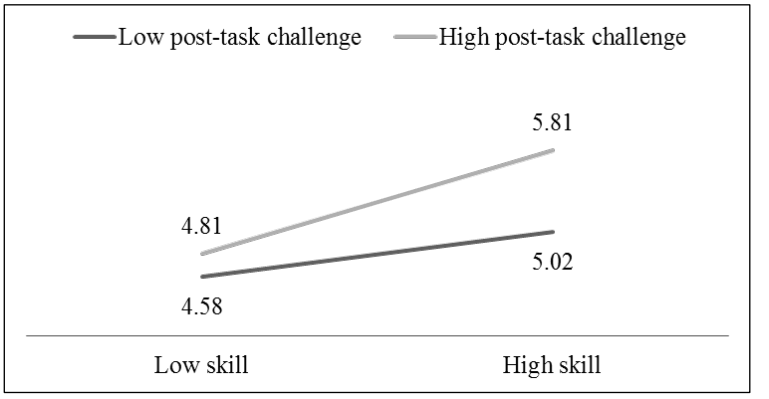


Figure 1. Means of flow in the conditions of skill and perceived challenge after the task

## V. Conclusion

This study examines the difference between the perceived challenge measured before and after an online shopping task for fashion products and compares the applicability of the interaction effects of skill and perceived challenge measured before versus after the task in explaining flow. This study contributes to the literature by verifying that perceived challenge varies depending on the measurement timing. Consumers tend to perceive higher challenge before the online shopping task than after the task. Although a few prior studies have already focused on the changeable nature of flow (Pearce et al., 2005; Wang & Hsu, 2013), their interest has not been extended to perceived challenge. Findings of this study indicate that performing the task can reduce perceived challenge by providing an informational experience.

Moreover, this study reveals that the interaction of skill and perceived challenge before the task does not significantly influence flow, while that of skill and perceived challenge after the task significantly influence flow. This finding illuminates that perceived challenge measured before a task is not applicable to verifying the flow theory, which has never been examined before. Based on this finding, it is recommended that researchers studying the flow theory or relevant topics need to avoid measuring perceived challenge before a respondent starts working on a task, and perceived challenge measured after the task is more appropriate to explain the flow theory.

Moreover, this study provides practical implications by demonstrating that consumers' challenge perception is decreased while shopping online for fashion products, which leads to the state of flow, a strong determinant of purchase intention (Hsu et al., 2012). This finding implies that consumers' experience on a shopping Website can lead to the perceived challenge reduction. Accordingly, Website managers of fashion retailers are recommended to motivate consumers to perceive a tolerable degree of challenge before browsing their Websites but design the consumers' experience on the Websites to decrease the high level of perceived challenge which helps the consumers

to reach flow. For example, a promotional task asking consumers to meet certain conditions (e.g., buy 2, get 1 free; free shipping on orders over $100; buying additional items related to a consumer's recent shopping history) may enhance consumers' challenge perception by evoking their goal for saving money, which then may become somewhat alleviated during their Website experience.

As a limitation of this study, skill was measured only before performing an online shopping task. To address the changeable nature of skill during a task, future research may be needed to compare skills measured before and after the task. This study is also limited by the use of composite scores of skill and flow despite the multidimensionality of the scales used to measure these variables. To improve the shortcoming, researchers can develop simpler scales measuring consumers' skill and flow perceptions in the context of shopping online for fashion products.

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